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Soviet Investment Strategy

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An Intelligence Assessment

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SOV 85-10033
February 1985

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Key Judgments

Information available as of 31 January 1985 was used in this report.

Soviet investment policy has evolved over the past decade from a strategy that emphasized massive infusions of new plant and equipment to sustain economic growth to one that relies on the more efficient use of capital assets and on more rapid technological progress.

The break with past policy occurred in the mid-1970s when the leadership decided to markedly slow the rate of growth of capital investment on the assumption that offsetting increases in capital (and labor) productivity would stimulate growth in GNP and in individual sectors of the economy:

- Plans for building new facilities were pruned, and plans for construction activity were focused on renovating existing structures.
- Existing machinery was to be replaced by new, technologically advanced equipment as the primary means of introducing new technology into the economy.

At the same time, inventories of unfinished construction were to be markedly reduced to soften the effects of slow investment growth on the introduction of new fixed capital.

Despite widespread evidence that the new investment policy was not working, the regime planned to continue it in the 11th Five-Year Plan (1981-85). The goal for the rate of growth of new fixed investment during 1981-85 was set lower than at any time in the postwar era.

The rationale for the investment policy was, first of all, that it would save resources. In theory, modernizing existing facilities is cheaper and faster than building new ones. Further savings should be generated from a resulting reduction in the huge repair bills run up by Soviet industrial enterprises each year. Reducing unfinished construction, finally, has always been viewed by Soviet planners as a cheap way of generating more operating fixed capital in a short time.

The results of the renovation policy have not measured up to expectations. The gains in capital productivity have not materialized, and new construction continues to grow more rapidly than planned. The policy failed in part because it was never implemented to the extent called for in Soviet plans:

- The machine-building sector failed from the very beginning to supply the assortment and quality of machinery required, partly because bottlenecks in the economy prevented these industries from receiving necessary raw materials, power, and semifinished products.

- Past planning decisions were also a factor. In allocating investment resources, for instance, the planners too often neglected the needs of the machinery industries.
- The perverse nature of the Soviet incentive and reward system caused enterprises to delay modernizing their facilities and made organizations within the investment complex reluctant to undertake renovation.

The policy also misfired because it was based on the calculation that it would reduce the demand for investment goods. Demand for investment has continued to grow rapidly and has far outpaced even the greater-than-planned supply of investment goods:

- The capital stock is so large that replacing just a small portion of it annually requires a rising share of investment resources.
- The renovation approach is unworkable in large areas of the country. In the industrial heartland of the European USSR, many facilities are too obsolete to be reconstructed. In the Siberian and eastern regions, there are few facilities to renovate.
- Demand for investment in new high-priority programs, such as those in agriculture and energy, continues to grow rapidly.

Even though Soviet industry needs modernizing, renovation alone will not do the job. What is required is the more efficient use of *more*, not *less*, investment. Indeed, the regime apparently has recognized the policy's shortcomings. Investment grew at more than twice the planned rate during 1981-84, suggesting that the renovation strategy was abandoned or ignored from the very outset of the 11th Five-Year Plan.

Meanwhile, Moscow seems to be having more success in its battle against unfinished construction, which had climbed rapidly in the 1970s. The value of unfinished construction in relation to total capital investment has declined in every year since 1979. As a result, the introduction of new fixed capital increased somewhat faster than capital investment in the first three years of the 1981-85 Plan. Even so, Soviet investigations suggest that some of these "commissionings" do not actually represent facilities ready for operation.

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Moscow could give its modernization program a shot in the arm by stepping up imports of machinery and equipment. Western imports, however, make up only a small share of total annual Soviet investment in machinery, and a marked step-up in such imports is unlikely given Moscow's limited hard currency revenues. In addition, the USSR's chronic difficulty in assimilating and diffusing the technology embodied in imported Western machinery is likely to persist. The East European countries are beset by serious economic problems of their own, making it unlikely that they can boost equipment sales to the USSR substantially in the near term, especially deliveries of the quality available in the West.

We can expect, therefore, a restructuring of investment policy in the 12th Five-Year Plan (1986-90). Investment growth will probably be stepped up, perhaps to a rate even faster than the average annual rate of increase of about 4 percent in 1981-84. With economic growth likely to remain slow during the rest of the decade, however, supporting large increases in investment will require sacrifices in other areas and force the regime to make exceedingly difficult choices among guns, butter, and growth.

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Introduction

Moscow's investment strategy for 1981-85 stresses modernization of industrial facilities, primarily by renovating and reconstructing existing production facilities. The number of new construction starts also was to be cut back; resources were to be concentrated instead on completing projects already in train. This strategy relies on associated increases in capital productivity to compensate for slower growth of capital investment. Such increases have not materialized, however. Indeed—as many Soviet officials now seem to recognize—more, not less, investment, including more new construction, is needed if the economy is to move ahead more rapidly.

In this assessment we describe and analyze the investment strategy adopted by the Soviets for the 10th (1976-80) and 11th (1981-85) Five-Year Plans. We then assess the results of the policy thus far in the 1981-85 planning period and explore the feasibility of relying on imports of machinery and equipment to alleviate investment problems. Finally, the implications of the success or failure of the investment policy are discussed. We wish to underline that the analysis deals not with investment policy in the sense of the allocation of investment resources among sectors but rather with how investment is to be carried out.

Background

Soviet officials have relied on large and growing increments of labor and new plant and equipment to sustain economic growth during much of the postwar period. In the 1960s, for instance, planners pushed the expansion of capital assets by allocating a large and rising share of resources to investment (particularly the construction of new facilities),[1] holding retirement rates to a minimum, and prolonging the service lives of equipment through repeated major repairs.

[1] Total capital investment—as measured in GNP accounts—accounted for about one-fourth of Soviet GNP in 1960. In 1975, that share had risen to over 30 percent. See *USSR: Measures of Economic Growth and Development, 1950-80*, Joint Economic Committee, 97th Congress, 2nd Session, 8 December 1982, pp. 66-67.

Beginning in the 1970s, however, resource constraints tightened and the leadership was forced to plan for "intensive" development of the economy—that is, reliance on more efficient use of resources and on more rapid technological progress for economic growth. Moscow therefore made a path-breaking decision in the mid-1970s. The leadership markedly slowed the rate of increase of new fixed capital investment rather than continue the brute-force kind of economic growth that resulted in sharply rising capital-output ratios. Growth of investment in the 1976-80 Plan was cut back to less than half the average annual rate of increase during the Ninth Five-Year Plan period (1971-75) (see table 1).[2] The slowdown in investment growth was predicated on the assumption that growth in GNP and in individual sectors of the economy could be sustained or even accelerated as a result of offsetting increases in capital (and labor) productivity. Thus, the so-called renovation and modernization strategy was formulated:

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- Plans for building new facilities were pruned, and construction activity was refocused toward the renovation of existing structures. Construction-installation work during 1976-80, for example, was planned to increase at less than half the average annual rate of growth achieved in 1971-75.

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- The 1976-80 Plan called for more rapid replacement of existing machinery with technologically advanced equipment as the primary means of introducing new technology into the economy.

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Despite indications that the new investment policy was not working, the planners sought to continue it in the 1981-85 Plan period. Total new fixed investment

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[2] It should be noted that some of the slowdown in investment growth during 1976-80 probably was not policy related. Industrial bottlenecks were a serious problem in the second half of the 1970s, becoming particularly acute for vital inputs for investment—such as steel and building materials—in 1979 and 1980.

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Table 1
USSR: Structure of New Fixed Capital Investment [a]

	1971-75	1976-80		1981-85	
	Actual	Plan	Actual	Plan	Actual [b]
Total gross fixed capital investment *(billion rubles)*	**493.0**	**621.4**	**634.3**	**700.0**	**750.0**
Index 1971-75=100	100.0	126.0	128.7	142.0	152.1
Index 1976-80=100			100.0	110.4	118.2
Average annual growth *(percent)*	7.0 [c]	3.2 [d]	3.4 [c]	1.6 [d]	3.8
Construction-installation work *(billion rubles)*	**299.4**	**359.1**	**343.0**	**357.0** [e]	**372.0**
Index 1971-75=100	100.0	119.9	114.6	119.2	124.2
Index 1976-80=100			100.0	104.0	108.5
Average annual growth *(percent)*	5.8 [c]	2.7 [d]	0.8 [c]	1.1 [d]	2.7
Share of total *(percent)*	60.7	57.8	54.1	51.0 [f]	50.0
Machinery and equipment *(billion rubles)*	**153.4**	**212.5**	**229.4**	**273.0** [e]	**298.0**
Index 1971-75=100	100.0	138.5	149.5	178.0	194.3
Index 1976-80=100			100.0	119.0	129.9
Average annual growth *(percent)*	8.7 [c]	4.5 [d]	6.5 [c]	2.5 [d]	5.5
Share of total *(percent)*	31.1	34.2	36.2	39.0	39.0
Other capital outlays [f] *(billion rubles)*	**40.2**	**49.8**	**61.9**	**70.0** [e]	**80.0**
Index 1971-75=100	100.0	123.9	154.0	174.1	199.0
Index 1976-80=100			100.0	113.1	129.2
Average annual growth *(percent)*	5.6 [c]	1.5 [d]	7.7 [c]	0.2 [d]	2.5
Share of total *(percent)*	8.2	8.0	9.7	10.0	11.0

[a] The data are expressed in so-called estimate prices (prices used for project estimates and for planning and reporting purposes) as of 1 January 1969. Adjustments have been included to take into account wholesale equipment prices introduced on 1 January 1973 and new-construction norms that were effective 1 January 1976.
[b] An average annual rate of growth of total new fixed capital investment was calculated from Soviet published data for 1981-84 and projected forward to obtain an estimated value for 1985. Average annual rates of growth of actual expenditures for construction-installation work and machinery and equipment during 1981-83 were calculated from Soviet published data. Corresponding data for 1984 and 1985 were constructed by projecting the 1981-83 figures forward using these growth rates. The other capital outlays category was treated as a residual in 1984 and 1985.
[c] Calculated from terminal year to base year for the five-year period (the base year is the year prior to the stated period).
[d] Calculated to exhaust the total for the five-year period when projected from the base year (the base year is the year prior to the stated period).
[e] Yu. Khrakovskiy, "Capital Investment in Construction Noted," *Agitator*, No. 7, April 1982. Translated in JPRS series, *Construction and Equipment*, No. 73, 22 September 1982.
[f] Includes outlays for survey work in the project planning stage as well as miscellaneous outlays.

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was planned to be 10.5 percent higher during 1981-85 than in 1976-80. This was equivalent to an average rate of increase of less than 2 percent annually.[3]

Expenditures on machinery and equipment as a share of total investment were set at 39 percent for 1981-85 compared with an actual 36-percent share during

[3] Originally an increase of 12 to 15 percent was planned. However, this target was revised downward before the final plan was adopted.

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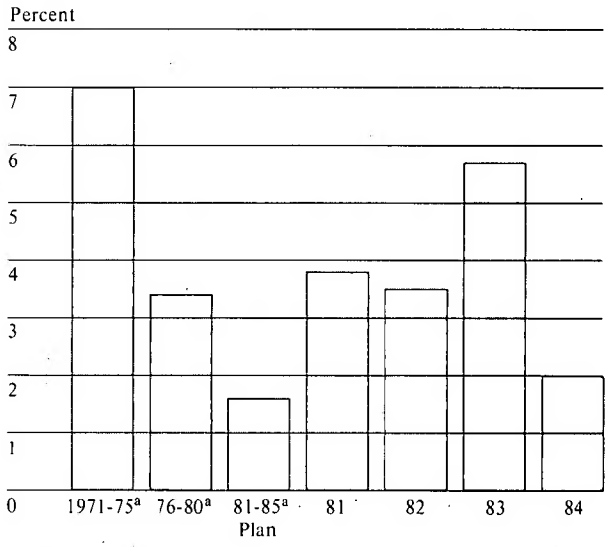
1976-80. The growth in construction outlays, meanwhile, was to slow to a snail's pace—a 1-percent average annual rate of growth was planned.[4]

In addition to the renovation strategy, the leadership has mandated that inventories of unfinished construction be reduced by cutting back new construction starts and completing projects in train.[5] During 1981-85, the Soviets plan to bring over 20 percent more new production capacity on line than they did in the 1976-80 Plan period. With capital investment scheduled to grow by only a little more than 10 percent, a large reduction in unfinished construction was planned to make the commissionings target attainable.[6]

The low investment growth strategy has been criticized at high party and government levels and by academics in the USSR because it has become more and more apparent that the policy is not working. In fact, controls on growth of investment appear to have been relaxed. Total investment has increased by about 4 percent per year on average during the first four years of the current planning period—a considerably faster rate of increase than the annual growth of less than 2 percent originally planned (see figure 1).

Figure 1
USSR: Growth in Gross Fixed Capital Investment, 1971-84



[a] Average annual percent.

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If investment continues to grow at the same rate during the last year of the current five-year planning period, investment in the first half of the decade would increase by 18 to 19 percent compared with 1976-80, almost double the growth of 10.5 percent originally planned. The more rapid increase in investment suggests that (1) the strategy of holding down investment growth was abandoned or ignored and the premise on which it was based rejected from the very outset of the 11th Five-Year Plan; (2) the planners have not been able to control investment from the center, particularly new construction, which has been increasing faster than planned; or (3) the leadership modified its plans in recognition of the need to provide more balance between renovation and reconstruction, on the one hand, and expansion of existing facilities and the building of new ones, on the other. As the following discussion demonstrates, we believe the last of these possibilities is the most convincing explanation, although the numerous complaints about the

[4] Gosplan Chairman Nikolay Baybakov announced in late 1982 that the share of equipment in state capital investment planned for 1983 and for 1981-85 overall had been increased to 42 percent (39 percent was the original goal) and that the share of construction would decrease accordingly. State capital investment makes up over 90 percent of total capital investment. If one assumes that the 42-percent share for equipment is appropriate for total as well as state capital investment, the implied rate of growth of machinery necessary to achieve this goal during 1981-85 is about 5 percent a year on the average, assuming the original investment goal of 700 billion rubles in 1981-85. To account for 42 percent of the expected actual total of about 750 billion rubles, machinery output would have to grow at an average annual rate of approximately 8 percent. Actual growth has averaged about 5.5 percent a year and would permit only a 40-percent share for machinery.

[5] Unfinished construction is construction and installation work in process but not finished to the point that the assets can be used. It also includes equipment in the process of being installed or actually in place in uncompleted structures.

[6] Additions to fixed capital (commissionings) equal new fixed investment (spending on new machinery and construction of buildings) minus retirements of the existing capital stock (taking machinery and structures out of service) minus changes in inventories of unfinished construction. Therefore, to increase the increment of new fixed capital brought on line, the leadership can step up investment, reduce retirements, reduce the increment to the inventories of unfinished construction, or implement some combination of the three.

unjustified growth in construction starts indicates that lack of control from the center has also been a factor.[7]

Reasoning Behind the Policy

Soviet plans to reduce investment growth in 1976-80 and in 1981-85 represented a general effort to redirect investment away from proliferation of existing facilities toward raising their technical level and quality. In view of the rapid rate at which capital costs have been rising in the USSR, such an objective would seem to make good sense.

Resource Savings. The dominant theme of the investment policy is the increased emphasis on renovating and reequipping existing facilities—as the most efficient means for speeding the introduction of modern machinery and equipment—at the expense of new construction. In theory, modernization of existing facilities through renovation is cheaper because it mainly involves replacing machinery and equipment, thereby reducing the time and expense of construction work. For example, a recent survey of 3,500 construction projects by the All-Union Bank for Financing Capital Investments found that, in terms of the cost of adding production capacity, new construction is about 11 percent more expensive than expanding existing facilities and about 23 percent more expensive than renovating facilities already in existence.[8]

The decision to shift the center of gravity of investment activity should also reduce the huge repair bills run up by Soviet industrial enterprises each year. Enterprises hold on to old productive assets through a program of extensive repair.[9] Estimating the cost of the repairs is difficult, and Moscow does not publish such statistics. According to one Soviet economist, expenditures for capital repair in industry alone were equivalent to more than one-third of capital investment expenditures in 1981. This implies a cost of about 17 billion rubles (see table 2); more than half was spent on the repair of machinery and equipment.

Table 2
USSR: Estimated Cost of Capital Repairs in Selected Sectors in 1981

	Cost *(billion rubles)*	Ratio of Repair Costs to Capital Investment
Industry	About 17	More than 1/3
Construction	2.3	0.43
Transport and communications	6.1	0.38

Sources: L. Smyshlyayeva, "Sovershenstvovaniye vosproizvodstvennoy struktury kapital'nykh vlozheniy," *Voprosy ekonomiki,* No. 9, 1983, pp. 25-36.
V. Krasovskiy, "Intensifikatsiya ekonomiki i problemy kapital'nogo remonta," *Planovoye khozyaystvo,* July 1983, pp. 2-18.

Capital repair is both labor and capital intensive. Repair activity, for example, absorbs 10 to 12 percent of the industrial labor force and employs more than one-third of the Soviet machine tool park.[10] Much repair work, moreover, takes place in small shops where costs are two to three times higher and quality lower than in specialized repair enterprises. The dispersal of activity leads to an increase in repair expenditures and obstructs the introduction of new technology, hinders the organization of effective repair, and results in wide differences in the quality of repair work.

The Soviets also consider renovation to be beneficial in other ways. Less retraining of existing personnel and less hiring of new personnel are usually required,

[7] Some Western scholars have argued that the increase in investment evident in the official Soviet statistics reflects mainly inflation in machinery and construction prices rather than real increases in investment. We do not believe this is true. For a discussion of this issue, see the appendix.

[8] See L. M. Smyshlyayeva, "Means of Maximizing Capital Investment Yields Analyzed," *Voprosy ekonomiki,* September 1983, pp. 25-35. Presumably, this does not include the additional costs associated with long delays in completing new plants. The excessive time and expense required to build new facilities have long been a serious problem in the USSR. The average leadtime from design to operation for large enterprises, for instance, is still as much as eight to 10 years.

[9] In Soviet practice, maintenance expenditures fall into two categories: current and capital repairs. Current repairs cover preventive maintenance and routine servicing of buildings, machinery, and equipment. Capital repairs involve major outlays to replace defective or worn components of existing assets to extend their useful life.

[10] See V. Krasovskiy, "Intensifikatsiya ekonomiki i problemy kapital'nogo remonta," *Planovoye khozyaystvo,* July 1983, p. 3.

and the construction of expensive complementary facilities such as housing and buildings providing cultural and personal services is usually not necessary. Moreover, supply and production relationships built up over years can be retained.

Mobilizing Idle Resources. There is nothing new in the aspect of investment policy that calls for reducing unfinished construction. This has always seemed to Soviet planners a cheap way of generating more fixed capital in a short time. Practically every five-year plan since World War II has called for such reductions. These goals, however, have seldom been achieved.[11] The value of unfinished construction at the beginning of the current five-year planning period, for example, was about double what it had been 10 years earlier.[12] The value of unfinished construction currently is equivalent to about 5 percent of the value of the Soviet capital stock.

The huge accumulation of incomplete capital investment projects in the USSR has several explanations. Two of the more important ones are the following:

- Bidders deliberately understate the resource requirements for capital projects on the generally correct assumption that (1) the lower the cost of the project the more likely it is to be approved and (2) once started, a project is not likely to be abandoned.

- A plan fulfillment system still rewards builders more for the value of construction activity than for the value of completed projects.[13]

[11] The 1976-80 Plan, for example, called for unfinished construction to decrease from 75 percent of capital investment at the end of 1975 to 65 percent by the end of 1980. At the end of 1980, the ratio of unfinished construction to capital investment was some 20 percentage points higher than planned.

[12] Because unfinished construction appears to be valued in current prices and because labor and material costs have risen, some unknown part of this increase may reflect inflation. Investment and capital stock values are officially claimed to be expressed in constant prices.

[13] By judging performance on the basis of the value of construction work, the authorities encourage construction organizations to focus on the early and middle stages of projects, which have a heavy material content, and to neglect the finishing stages, which require mainly specialized labor.

The rapid commissioning of a large portion of this pool of idle assets would benefit the economy in a number of ways. It would provide an immediate, albeit one-time, boost to the operating capital stock. It also would reduce the inevitable waste associated with capital assets sitting idle. Not only do these assets age and deteriorate physically, but they also age in a technological sense. That is, their delayed use dilutes benefits to the economy that could be gained from the more immediate use of the advanced technology.

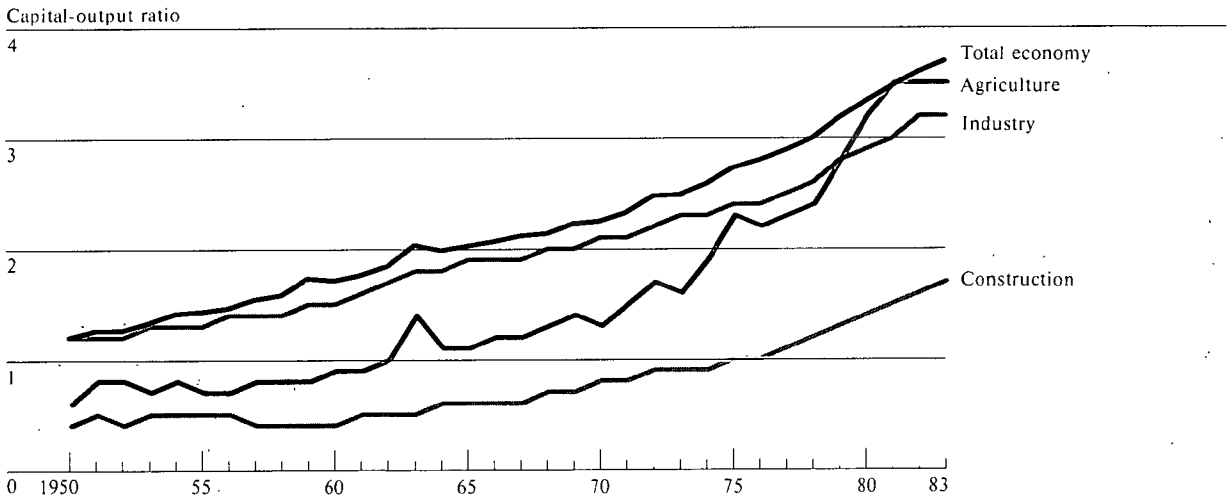
The Soviets could also benefit by concentrating on putting into operation unfinished construction in bottleneck areas that have been so damaging to the Soviet economy in recent years. Sectors would have to be prioritized according to the potential economic payoff. In high-priority sectors—perhaps rail transportation, ferrous metals, and machinery—the influx of capital could be used to more quickly complete expansion projects. In lower priority areas, current projects could be delayed or stretched out to allow this transfer of resources. The potential benefit of such an approach would seem substantial.

In the longer term, however, a rapid reduction could be somewhat disruptive. The amount of new capacity brought onstream would eventually drop off markedly until the number of construction projects in train could be replenished and a sufficient period had passed to allow new construction projects to be put in process. In other words, a continual flow of work in the pipeline is necessary to ensure a smooth introduction of new plant and equipment into the economy each year.

Is the Policy Working?

The results of Moscow's investment policy have not measured up to the expectations of the Soviet leadership. With respect to modernization, the gains in capital productivity called for have not materialized. Capital-output ratios have continued to rise; the ratio for the overall economy increased by about one-third from 1975 to 1983 (figure 2). Construction times have not decreased much, if at all, and new construction activity is growing far more rapidly than planned during the current five-year plan.

Figure 2
USSR: Capital-Output Ratios, 1950-83



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In addition, the volume of unfinished construction has been growing rapidly throughout most of the 10th and 11th Five-Year Plan periods. Only recently do the Soviets appear to have had some success in stemming its growth. Thus, few if any of the advantages of the "intensive" investment policy have materialized. Economic growth has been slow, and production goals have not, in general, been met.

Statistical Measures. The extent to which the renovation policy has failed is not readily apparent in Soviet statistics. First, neither construction nor equipment expenditures are broken down into outlays on renovation, expansion, and new construction in the total fixed capital investment data published by the Central Statistical Administration (see table 3).[14]

Second, even though state capital investment figures now list expenditures for each of these three categories (see table 4), the data have been published only since 1980. Moreover, we suspect that these figures are unreliable. Construction organizations and enterprise managers often conspire to thwart the will of the central authorities by undertaking what is essentially new construction while reporting it as renovation. New shops are added or completely new enterprises are built on the grounds of those already in operation or on adjacent tracts and are reported to the authorities as renovation. An example is the "reconstruction" of a machinery factory in Karlovka. Its productive floorspace of 2,800 square meters increased almost six

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[14] According to Soviet definitions, "new construction" *(novoye stroitel'stvo)* is the erection of an enterprise, building, or structure at a new site and according to a design approved by appropriate authorities. "Expansion" *(rasshireniye)* is defined to include construction, under a new design, at an existing enterprise, manufacturing complex, or other production facility. This includes construction of new as well as expansion of existing facilities (including auxiliary and servicing facilities and supply lines). Expansion work is done either on the land at the existing facility or on an adjacent site. Renovation consists of "reconstruction" *(rekonstruktsiya)* and "technical reequipping" *(tekhnicheskoye perevooruzheniye)*, which are the complete or partial reequipping and rebuilding of production facilities. This encompasses the introduction of new engineering technology and the replacement of obsolete and physically worn equipment by new, more productive equipment. Reconstruction activity can and often does include the erection or expansion of auxiliary and servicing facilities but not new construction of basic production facilities.

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Table 3 *Percent*
USSR: Growth of the Construction and Machinery Components of Capital Investment

	Average Annual		Annual			
	1971-75	1976-80	1981	1982	1983	1984
Total investment	7.0	3.4	3.8	3.5	5.7	2.0
Construction	5.8	0.8	1.9	2.0	4.2	NA
Machinery and equipment [a]	8.7	6.5	5.1	4.7	6.8	NA

[a] The machinery and equipment component of new fixed investment includes both domestically produced and imported machinery.

Source: *Narodnoye khozyaystvo SSSR v 1983 g.*, p. 356; *Pravda*, 26 January 1985, pp. 1-2.

Table 4
USSR: State Capital Investment in Reconstruction, Expansion, and New Construction [a]

	1980	1981	1982	1983
Reconstruction of existing enterprises *(billion rubles—1976 prices)*	21.5	22.6	24.1	26.0
Rate of increase *(percent)*		5.1	6.6	7.9
Expansion of existing enterprises *(billion rubles—1976 prices)*	18.3	18.3	17.9	18.8
Rate of increase *(percent)*		0	−2.2	5.0
New construction *(billion rubles—1976 prices)*	23.7	24.9	25.7	27.1
Rate of increase *(percent)*		5.1	3.2	5.4

[a] State capital investment is carried out by state organizations. It excludes investment by cooperative enterprises and collective farms and construction of individual housing by the population.

Source: *Narodnoye khozyaystvo SSSR v 1983 g.*, p. 360.

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times to 16,100 square meters. Construction of new projects on the enterprise's property accounted for more than 80 percent of the total outlays on the project.[15] How much reconstruction is actually new construction in the published statistics is hard to tell, but we believe that it may be a substantial portion.

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Retirement Rates Imply a Lack of Success. Soviet statistics on retirement rates of capital stock give a clearer indication of the ineffectiveness with which Moscow has implemented the renovation policy. The USSR publishes statistics on the value of industrial capital stock retired in a given year as a percentage of the value of the capital stock at the beginning of that year. These statistics are broken down into buildings and structures, machinery and equipment, and other capital assets. As table 5 shows, the overall rate—always low compared with that of Western countries—moved steadily downward except for a slight rise in 1983. In the case of buildings and structures—which make up almost half of the capital stock—the decline is not inconsistent with a policy that has stressed renovation rather than elimination of existing buildings and structures. However, the generally downward trend, particularly since 1980, in the retirement rate of machinery and equipment—about 40 percent of the capital stock—suggests that Moscow's investment policy has not been successfully carried out. The key element in that policy has been replacement of obsolete machinery, a tack that—if properly executed—would be associated with rising retirement rates.

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Unfinished Construction. Recently, Moscow appears to be having some success in holding down unfinished construction. Soviet data show that the value of unfinished construction fell by more than 1 percent in 1980—the first reduction in at least 20 years. Moreover, the value of unfinished construction expressed as a percent of total capital investment has decreased every year since 1980. The 1984 plan also called for a reduction in the level of unfinished construction (see table 6).

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[15] See David A. Dyker, *The Process of Investment in the Soviet Union*, London, Cambridge University Press, 1983, pp. 41-42.

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Table 5
Published Retirement Rates of Soviet Industrial Capital Stock [a]

Percent

	Total	Buildings and Structures	Machinery and Equipment	Other [b]
1965	2.1	NA	NA	NA
1970	1.8	NA	NA	NA
1975	1.6	0.8	2.4	NA
1976	1.5	0.7	2.3	2.1
1977	1.5	0.6	2.4	1.8
1978	1.4	0.6	2.4	1.6
1979	1.4	0.6	2.4	1.6
1980	1.4	0.5	2.5	1.6
1981	1.3	0.5	2.3	1.4
1982	1.2	0.4	2.2	1.3
1983	1.3	0.4	2.3	1.4

[a] Only a total retirement rate was published for 1965-70 (except for 1966 when no data were published). For 1973-75 a total retirement rate was published, broken down into buildings and structures and a category that included machinery and equipment, communications equipment, transportation, and other fixed assets. Since 1976, data have been published in the three categories shown.
[b] Includes outlays for survey work in the project planning stage as well as miscellaneous outlays.

Source: *Narodnoye khozyaystvo SSSR*, various issues.

Table 6
USSR: Value of Unfinished Construction [a]

	Value (billion rubles at current prices)	Percent of capital investment [b]
1975	76.7	75
1976	84.1	80
1977	92.5	85
1978	99.0	85
1979	106.4	91
1980	105.1	87
1981	108.0	86
1982	108.9	84
1983	109.8	80
1984 (Plan)	105.8 [c]	75

[a] Data are for state and cooperative enterprises and organizations only. Excluded is unfinished construction on collective farms and in the private sector.
[b] These values are expressed as a percent of investment by state and cooperative enterprises and organizations as reported in constant prices. In 1982, this was about 90 percent of total capital investment.
[c] Estimated.

Source: *Narodnoye khozyaystvo SSSR v 1983*, p. 367.

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The leadership has been pressuring construction enterprises and ministries to reduce the pool of idle capital assets and bring new capacity on line faster. Plan goals for trimming unfinished construction have become more stringent, and personnel in the construction sector have been told in no uncertain terms to toe the mark. For example, Yuriy Andropov's speech, read to the party Plenum in December 1983, called for "real improvements in the state of things in construction." The key to success, he said, is in "raising the responsibility of [construction] personnel and strictly demanding from them an irreproachable execution of their duties."

The gains the Soviets reportedly have made in reducing the growth of unfinished construction, however, are called into question by recent evidence indicating that enterprises may be manipulating their statistical reporting to meet the more stringent targets being set for them. The Soviets themselves are questioning the reliability of the recent data. The Central Statistical Administration (CSA) recently reported in its journal *Vestnik statistiki* that a special study was conducted on the reliability of the reported data on additions to industrial capacity in the fourth quarter of 1983. Serious inaccuracies apparently were found, and, as a result of the study, various divisions in the CSA have been instructed to carry out additional checks to determine whether the data include incomplete projects. If so, production capacity has not grown as rapidly as has been reported recently—the Soviets reported a 9-percent increase in commissionings of

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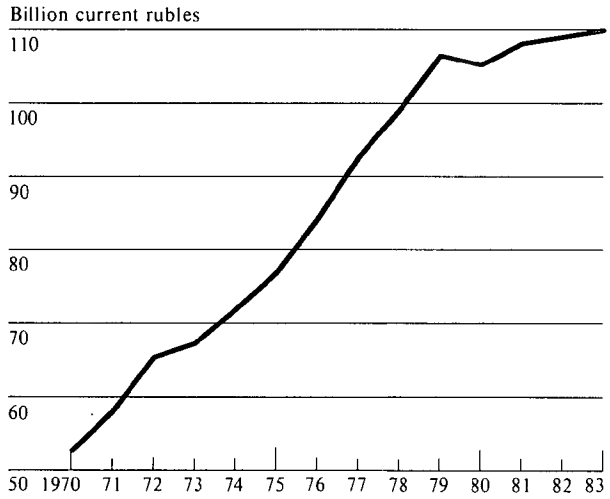
Figure 3
USSR: The Value of Unfinished Construction in the Total Economy, 1970-83



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fixed capital during the first half of 1984 compared with commissionings in the same period in 1983—and inventories of idle capital assets are larger than the data suggest.

We doubt that the gains will be lasting in any case. As was mentioned earlier, the Soviets rarely have reduced inventories of unfinished construction for very long, although reductions have been called for in almost every annual and five-year plan in the postwar period. During the 10th Five-Year Plan, for example, the volume of unfinished construction increased by a robust 6.5 percent annually (see figure 3).

Why Has Soviet Investment Strategy Failed?

The investment strategy embodied in the 1981-85 Plan has failed for a number of reasons. First, the renovation strategy has not been implemented to the extent the leadership said it would be and presumably wanted it to be. Second, the decision to reduce markedly the rate of growth of capital investment (on the assumption that increases in capital productivity are consistent with slowing investment growth) was misguided.[16] 25X1

Problems From the Beginning. The renovation approach may have been doomed from the start. The policy had no sooner been formulated and adopted as part of the 10th Five-Year Plan when several factors prevented the machine-building sector from supplying the necessary machinery and equipment:

- Bottlenecks developed in industrial branches providing essential materials. Particularly damaging was the inability of the metallurgical industry, the principal supplier of materials for machinery production, to supply the mix and quality of steel products required.
- The productivity of machinery plants was affected by problems in the production and distribution of electric power, oil, and gas.
- Bottlenecks in freight transportation impeded operations in machinery plants. Rail congestion, for example, has interfered with raw material supplies and with shipments of final products to other machinery producers.[17] 25X1

As a result, the growth of machinery output has slowed (see tables 7 and 8). Both the quantity and the quality of machinery needed to implement the new investment policy have been inadequate. 25X1 25X1

[16] We believe these are the two primary reasons for the failure of the investment policy to produce the results the leadership hoped for. Several other factors, beyond the scope of this paper, have been important as well. Capital costs also have continued to rise because of (1) necessary or desirable investment that does not increase production capacity proportionately (for example, investment in social overhead capital—transportation, trade and supply facilities, and the like); (2) rising capital requirements per unit of output produced in many industries—such as coal and oil—because of such factors as increasing difficulties in extracting and processing raw materials as well as stiffer environmental protection requirements; and (3) possible inflation in the prices of new equipment and construction (see the appendix). Mistakes made by planners in the allocation of investment goods also have contributed to the rise in capital-output ratios. Too little investment in industries that extract and process raw materials as well as in rail transport facilities, for instance, has hindered production in industrial sectors that manufacture final goods. 25X1 25X1

Table 7 *Percent*
USSR: Growth of Civilian Machinery Output

Average Annual		Annual			Preliminary 1984
1971-75	1976-80	1981	1982	1983	
9.0	6.0	3.5	4.6	5.5	6.0

In addition, poor planning decisions, particularly in the allocation of investment resources, have hindered the policy's implementation. Investment in the machinery industries, for instance, has been too low given the needs and importance of this sector, which needs to be modernized. Indeed, we believe that the rise in capital-output ratios in the USSR will not be arrested until the technological level of Soviet machinery and equipment is raised substantially and on a continuing basis. One Soviet author estimates that 30 to 40 percent of all equipment now in operation in the USSR has been in use for 15 to 20 years or more.[18] Because the machinery sector has not been adequately modernized, its ability to produce the quantity, and more important, the quality of equipment required to refurbish other branches of industry has been impaired.

According to Soviet statistics, fewer new machines are being introduced in the 11th Five-Year Plan (1981-85) than during the 10th Five-Year Plan (1976-80). About 3,700 prototypes of new models of machines, equipment, and other devices were introduced on average each year during 1976-80.[19] In 1981, however, only about 3,250 prototypes were built, and approximately 3,450 were manufactured in 1982. The Soviets did somewhat better in 1983 when about 3,630 prototypes were manufactured.

The shortcomings of machine-building enterprises with respect to supplying modern machinery were

[18] See M. S. Zotov, "Intensifikatsiya investitsionnogo protessa," *Voprosy ekonomiki*, February 1984, p. 11.
[19] See *Narodnoye khozyaystvo SSSR v 1983* g., pp. 100-101.

Table 8 *Percent*
USSR: Growth of Investment in Industry and in Machine Building and Metalworking

	1976-80	Plan 1981-85 [a]	1981	1982	1983
Total industrial investment	3.7[b]	4.2[b]	4.0	2.8	5.5
Investment in machine building and metalworking	4.2[b]	3.4[b]	4.2	0.8	6.4

[a] Estimated.
[b] Average annual rate of growth.

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evident in our recent studies of individual Soviet industries:

- The major innovation in manufacturing technology since World War II has been the marriage of machine tools and electronics. Instead of operating machine tools by hand, modern technology involves controlling the movements of machines through coded instructions transmitted electronically by a controller from directions contained on cards or tape or from a computer. Numerically controlled machine tools are now widely used throughout the West, but Soviet industry has been far slower in producing this technology. The multiaxis machine tool, which is operated by advanced controllers and computers, is a particularly striking example. Since 1972, the USSR has produced only about 1,400 machine tools capable of simultaneous contouring on three or more axes. The estimated annual production of these in the USSR in 1980 and 1981 was roughly 300 compared with about 5,000 in the United States and more than 7,000 in Japan.[20]

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- In agriculture, the backwardness of Soviet agrotechnology is one of the principal reasons for the failure of the effort begun in 1976 to develop the

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agricultural base of the Russian Nonchernozem Zone (RNCZ). For example, of the entire series of farm machines planned and designed especially for the RNCZ—including machines for constructing drainage, removing bush and stones, spreading fertilizer and agrochemicals, and harvesting grain—only a few have even been tested, let alone produced.[21]

- The failure to introduce new technology into domestically produced machinery and equipment has been one of the main causes of the slowdown in the growth of fertilizer production in the USSR since the mid-1970s. Domestically produced equipment is outmoded and of poor quality, lacks corrosion resistance, and wears out prematurely. Western equipment operates three times longer than Soviet equipment. New facilities at the Soligorsk potash mine, for instance, did not operate at the start because the design of the domestic equipment used there was obsolete; its output was so low that redesigning and rebuilding new equipment was necessary. One year from start-up, the facility was reported as operating at only 36 percent of capacity.[22]

- Shortages and poor-quality equipment have been problems in the energy sector as well. In the electric power industry, for example, about 10 percent of total electric-power-producing capacity is generated by obsolete equipment that often breaks down and is costly to maintain. Flaws in the quality and design of new equipment and components have played a major role in retarding the increase in the efficiency of electric power generation in the USSR.

- The deterioration of existing equipment and difficulties in finding replacements have contributed to problems in the Soviet forest products industry. Nearly two-thirds of the factories in this industry, for instance, are outfitted with obsolescent machinery. Some major plants operate on a technological level comparable with that of the United States in the 1930s and 1940s.[23]

Another factor leading to sluggish implementation of the renovation policy is the Soviet economic system itself. The incentive and reward system leads enterprises to delay production of new models of equipment and modernization of their facilities. In doing otherwise, enterprises run the risk of disrupting production and not meeting output targets—the basis for bonuses and promotions. 25X1

More important, organizations within the investment complex—design organizations, construction enterprises, and machinery firms—often obstruct renovation even though they are primarily responsible for carrying it out. Incentives in the machine-building industry, for example, favor the manufacture of serial, standardized equipment rather than machines made to fit the specific conditions and dimensions of an enterprise under renovation. Similarly, design organizations prefer to plan new enterprises, because standard serial projects are easier and more profitable. The same is true of construction firms in the Soviet Union. They are ill equipped to carry out renovation work and find it inconsistent with their interests. Renovation projects are 20 to 35 percent more labor intensive and 75 percent less profitable than new construction. 25X1 25X1 25X1

A Misguided Strategy. The leadership's decision to reduce the growth of new fixed investment was based on the calculation that the renovation and reconstruction of enterprises would reduce the demand for investment goods. Instead, the demands on investment resources have continued to grow rapidly and have outpaced even the greater-than-planned growth in the supply of investment goods for three main reasons. First, the Soviet capital stock is currently so large that replacing just a small portion of it requires a substantial share of capital investment resources annually. In 1983, for instance, the retirement rate was only 2.2 percent, but the value of the total capital stock retired was equivalent to about 28 percent of total capital investment. Even if the retirement rate falls to 2 percent and the average annual growth of new fixed investment rises to 5 percent in 1985-90, the ratio of the value of annual retirements to investment expenditures will remain above 25 percent throughout the decade. 25X1 25X1 25X1

Second, the renovation approach is not workable in large areas of the country. It is clear from the Soviet literature, for instance, that many of the existing industrial facilities are so decrepit that they cannot be reconstructed easily, if at all. This is especially true in the thickly populated regions of the European USSR, the northwest, the Urals, and the Donetsk-Pridnepr basins (in other words, the old industrial core of the Russian empire). Modern industry requires facilities that have a broad assortment of heating and ventilation equipment. Most old buildings in the USSR cannot be easily converted to accommodate such equipment. Even when the renovation approach is workable and advanced technology is available, new structures still are sometimes required to house sophisticated new machinery and ancillary devices and systems. Reconstruction is also not appropriate in the Siberian and eastern regions of the USSR. In these areas, mostly new construction is necessary because there are few existing manufacturing facilities and little infrastructure is actually in place.

Third, the demand for investment in new, high-priority programs continues to grow rapidly. For example, Moscow has adopted costly new programs in agriculture and energy, and the needs of other important sectors, such as rail transport, continue to increase. The capital requirements of these sectors can be met only if there is substantial introduction of capital assets where none now exist.

Thus, while Soviet industry needs to be renovated, much new construction is necessary also. All of this may require the more efficient use of *more*, not *less*, investment.

Imports—A Way Out?

Moscow could give its modernization program a shot in the arm by stepping up imports of advanced machinery and equipment. Imported machinery from Communist and non-Communist countries together makes up a substantial part of the equipment portion of total investment—about one-third—and has played an important role in revitalizing selected Soviet industries in the past. (We estimate that about two-thirds of Moscow's total machinery imports come from Communist countries; roughly one-third is imported from non-Communist nations.) For example, Western equipment and technology have contributed heavily to production in the ammonia, nitrogen, and fertilizer industries. Indeed, large ammonia plants based at least in part on Western technology provided more than 90 percent of Soviet domestic capacity introduced during the 1970s. 25X1

Machinery imports from the West have the greatest potential benefit to the Soviet economy since they are, in general, the most technologically advanced. However, imports of Western equipment make up only a small share of total annual Soviet investment in machinery—about 10 percent or less. Even though Western machinery is more productive on the average, such imports would have to be increased markedly if the overall impact is to be large. However, a steep rise in imports would require a substantial increase in hard currency expenditures, which Moscow is unlikely to make in the absence of a sharp gain in hard currency revenues. Such a rise in hard currency availability is unlikely. Another round of price increases for the USSR's major export earners—energy and gold—such as the windfall gains of the 1970s, is not expected in the near future. Nor are the Soviets likely to be willing to markedly increase their hard currency borrowing to sustain high import growth as they did in the first part of the 1970s. In fact, the Soviets are scaling back imports from the West. Equipment orders, for example, have fallen from $6.9 billion in 1981—when large orders for the gas export pipeline were placed—to $2.2 billion in 1983 and to less than $700 million in the first nine months of 1984. (Excluding orders for petroleum-related equipment, the decline was from $2.6 billion in 1981 to $1.4 billion in 1983 and to $600 million in January-September 1984.) 25X1 25X1 25X1

The regime is trying to get more and better goods, including machinery, from its allies, particularly Eastern Europe. The East European countries, beset by serious economic problems of their own, exported 14.9 billion rubles' worth of equipment to the USSR in 1983—roughly one-quarter of the total Soviet investment in machinery and equipment. It is unlikely, given their economic situation, that they could significantly boost their equipment sales to the USSR soon. Besides, much of this equipment is an inferior substitute for that produced in the West. 25X1 25X1

Finally, the Soviets would have trouble assimilating a large amount of imported machinery and technology even if they could acquire it. Soviet use of imported Western plant and equipment, in particular, has fallen short of its potential for improving the USSR's economic performance. The Soviets take a disproportionately long time acquiring and diffusing imported Western equipment. This is primarily because the research and development needed to embody imported technology in domestically produced equipment usually does not begin until the import has been ordered, delivered, installed, and effectively operated in a "prototype factory" setting.[24]

Implications

The Brezhnev, Andropov, and Chernenko regimes all have called the modernization and reequipment of existing facilities one of the most important tasks in the current economic development of the Soviet Union. For the most part, however, the intensive investment policy put into effect almost a decade ago has largely missed the mark. The renovation aspect of the policy—that is, the emphasis on replacing outmoded machinery and equipment—has not been well implemented, but, more important, the policy is misguided. In our view, a more carefully structured balance between new investment and renovation is necessary. The only element of the 1981-85 investment policy that appears to be on track is the plan to bolster commissionings of new capacity by reducing inventories of unfinished construction. Even here, however, the apparent gains in this area may be more illusory than real.

This generally pessimistic assessment of the renovation strategy appears to be shared by many Soviet officials. A "Business Club" roundtable discussion that *Pravda* held recently, for instance, pointed to major difficulties in implementing the renovation program in the Ukrainian Republic.[25] It was pointed out that 75 percent of all investment in the republic is still being used for new construction, and 80 percent of all new equipment is being installed in newly built factories. Among the reasons cited for the policy's poor showing were the following: (1) perverse incentives, which discourage construction ministries from undertaking reconstruction; (2) inadequate funding for installing equipment; (3) a lack of qualified workers; (4) the inability of the machinery industry to keep pace with the increased demand for more efficient, specialized equipment needed for renovation; and (5) inflation in machinery prices.

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The regime will be under heavy pressure, therefore, to restructure its investment policy for the 12th Five-Year Plan (1986-90). This will almost certainly require that investment growth be stepped up, perhaps to a rate even faster than the average annual increase of approximately 4 percent in 1981-84. This, in turn, will require some very difficult choices to be made when drawing up the plan. With economic growth likely to continue to be slow during the remainder of the decade—perhaps 1.5 to 2.5 percent a year on average—the traditional choices among guns, butter, and growth will be even more difficult than in recent years.[26] Supporting large increases in investment will require substantial sacrifices in other areas. Stepping up production of producer durables, for instance, will leave less machine-building capacity to produce military hardware and consumer durables. Taking from the consumer would be especially painful.

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Faster investment growth could also lead to more strained relations between the Soviet Union and its allies. Eastern Europe, for example, will be asked to export more high-quality machinery and possibly more consumer durables to the USSR to lessen the burden on the Soviet machine-building industry. The need to import more machinery from the West also could lead the Soviets to cut back energy exports to Eastern Europe. In this way, Moscow would free energy resources for sale in the West and earn the hard currency necessary to buy more Western machinery and equipment. Because the East Europeans are having economic problems of their own, they would strenuously resist efforts by Moscow to squeeze them harder.

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[25] See *Pravda*, 30 July 1984.

Appendix

Inflation and Soviet Investment Statistics

Several Soviet and Western economists maintain that official Soviet investment statistics are inadequately adjusted for inflation. The implication is that growth in Soviet investment has thus been overstated. In particular, some Western scholars hold that the acceleration in the growth of investment expenditures thus far in the 11th Five-Year Plan does not represent an increase in real investment, reflecting a change in investment policy, but rather is the result of inflation in the prices of machinery and construction work.

For reasons discussed in the next section, we doubt that fixed capital investment has undergone more than marginal inflation for many years. Furthermore, we do not believe that inflation in investment prices—to the extent that it has occurred—has been greater in the first half of the 1980s than in the second half of the 1970s. In fact, as also explained below, inflationary pressures appear to have eased in the 1980s. But the judgment in this paper that real investment growth was faster in 1981-84 than in 1976-80—and thus our conclusion that a policy change had taken place—would be invalidated only if prices have increased at a faster rate in the 1980s than previously.

Some Recent Arguments

One of the leading Western proponents of the inflation thesis has been Alec Nove.[27] He maintains that (1) inflationary increases in machinery and construction prices are not captured in Soviet price indexes, and therefore (2) deflation of investment data by these indexes causes the published investment statistics to be overstated.

More recently, Philip Hanson addressed the issue in two articles. In the October 1984 issue of *Soviet Studies,* Hanson concludes that estimates of concealed inflation in machinery prices compiled by Soviet economists Khanin and Fal'tsman are "the most plausible we have."[28] Khanin implies that the true rate of price inflation for domestic machinery in the USSR during 1970-80 was 3.7 percent a year; Fal'tsman implies that the rate of inflation for domestically manufactured producer durables was about 2.8 percent a year on average during 1976-80 and 8.6 percent a year on average for imported machinery. Assuming that imported machinery makes up roughly 30 percent of investment in equipment, this implies a 4.5-percent annual rate of inflation in the equipment portion of investment during 1976-80—a significant rate of increase. 25X1

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In a second article, Hanson reports on the findings of a study of eight branches of industry by Soviet economists Fal'tsman and Kornev that shows a 43-percent increase in the "real" investment cost of an additional unit of industrial capacity in the USSR during 1971-75 and 1976-80.[29] The increase is broken down into a 23-percent rise in construction costs (60 percent of investment spending) and a 72-percent increase in equipment costs (40 percent of investment spending). 25X1

Of the 72-percent increase in equipment costs, 21 percentage points (29 percent) was reported as due to rising costs of imported equipment, 11 percentage points (15 percent) to rising costs of domestic equipment, 32 percentage points (44 percent) to increases in investment not directly connected with production capacity, and 8 percentage points (11 percent) to what Fal'tsman and Kornev call "other" factors. 25X1

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Assessing the Evidence

Our assessment is that available evidence does not support the notion that the surge in investment growth during 1981-84 was the result of greater inflation in machinery and construction prices and not a decision by the leadership to step up investment spending. On

[27] A. Nove, "A Note on Growth, Investment, and Price Indices," *Soviet Studies,* Vol. XXXIII, No. 1, January 1981, p. 143.

[28] Philip Hanson, "The CIA, the TsSU, and the Real Growth of Soviet Investment," *Soviet Studies,* Vol. XXXVI, No. 4, October 1984, pp. 571-581.

[29] Philip Hanson, "USSR—New Evidence About Soviet Investment," Radio Liberty 343/84, Munich, Germany, 13 September 1984.

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the contrary, to the extent that inflation does exist, it almost certainly has been less severe in the 1980s than in the second half of the 1970s. In the first place, imported machinery prices have been rising less rapidly during the last four years because of a general softening of equipment prices in Western markets. Yet, according to the Soviets, Western machinery costs are a major source of inflation in the USSR. In addition, Moscow has controlled wages more tightly in the current five-year planning period. During 1976-80, the average wage of workers and employees in the USSR rose over 3 percent a year on the average compared to about 2.5 percent a year during 1981-83. Indeed, the Fal'tsman-Kornev article projects (as of mid-1984) a rise of 11 percent in the cost of Soviet-manufactured equipment per unit of productivity in 1981-85 compared with the cost in 1976-80. The figure for 1976-80 was 15 percent higher than the figure for 1971-75, suggesting some deceleration in the early 1980s compared with the late 1970s.[30]

In any case, we are not convinced that inflation in investment costs in the USSR has been nearly as severe in the 1970s or 1980s as Nove and Hanson suggest. In considering these studies, two aspects of the problem have to be distinguished: (1) the declining productivity of investment and (2) inflation itself.

First, with regard to the declining productivity of investment, Hanson's September 1984 article points out—and we agree—that capital costs are rising in the USSR. The increases, however, appear to be due less to price inflation than to a decline in the productivity of investment. That is, the rapidly increasing costs of commissioning new capacity in the USSR mainly reflect an increase in the amount of capital assets required to move, process, and transport a given amount of output. Among the various factors responsible for the rising trend in the cost per unit of output produced are the following:

- The increasing dependence of the Soviet economy on the Siberian areas of the country for fuels and raw material resources. Developing these new resource areas requires heavy capital investment both in basic facilities for exploration and exploitation and for social overhead capital.
- The declining quality of readily available raw materials from the more "traditional" locations in the European USSR. As lower quality resources are being extracted from more distant, less hospitable locations, capital costs are rising more rapidly than output.

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Although "pure" inflation probably was present during the late 1970s and early 1980s, we are suspicious of Soviet studies that indicate it is severe. First, we have no way of evaluating the methodologies employed in these various Soviet studies. They are never clearly explained and the results presented are always ambiguous. In the Fal'tsman and Kornev study, for instance, we do not know—as Hanson notes—how the figures presented were actually derived. Nor do we have any way of judging the representativeness of the statistical samples used by the Soviets in these studies.

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Second, Soviet as well as Western economists may be incorrectly interpreting the results of the Soviet studies. For example, the Fal'tsman-Kornev finding (*Voprosy ekonomiki*, June 1984) of a 15-percent increase in "the cost per unit of productivity" of domestically produced equipment does not mean that machinery prices were 15 percent higher in 1976-80 than in 1971-75. In addition to having a greater capacity, a new machine may work to closer tolerances, waste less metal, require fewer operators per machine-hour, need less maintenance, last longer, or occupy less space. A simple comparison of percentage changes in a machine's "capacity" and its price does not, in the Soviet economic environment, take into account all of the relevant differences. Hence, such a comparison cannot be construed as a measure of inflation in machinery prices.[31]

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Third, the results of other research indicate that inflation in the investment sector has been minimal. Stanley Cohn found, for example, that the likely overall upward bias in Soviet investment because of

[30] Price indexes reportedly were estimated for 37 categories of machinery, which account for 40 percent of deliveries of Soviet-manufactured machinery to capital investment.

[31] For a further discussion of this issue, see Robert E. Leggett, "Measuring Inflation in the Soviet Machinebuilding Sector, 1960-1975," *Journal of Comparative Economics*, June 1981, pp. 183-184.

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inflation is "less than 1 percent per year."[32] Our own research on this, although somewhat out of date, found inflation in domestic machinery prices to have been almost negligible in the late 1960s and early 1970s.[33]

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[32] Stanley H. Cohn, "A Comment on Alec Nove: A Note on Growth, Investment, and Price Indexes," *Soviet Studies,* Vol. XXXIII, No. 2, April 1981, pp. 296-299.

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[33] Leggett, loc. cit.

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